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TFT LCD Approval Specification

MODEL NO.: M156B3-L01

Customer: _____

Approved by: _____

Note:

核准時間	部門	審核	角色	投票
2009-04-09 10:19:10	MTR 產品管理處	吳 2009.04.09 柏 勳	Director	Accept

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	Date	Section	Description
Ver. 2.0	Mar. 25, 09	-	M156B3-L01 Approval Specifications was first issued.

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1. GENERAL DESCRIPTION

1.1 OVERVIEW

M156B3-L01 is a 15.6" wide TFT Liquid Crystal Display module with white LED Backlight unit and 30 pins 1ch-LVDS interface. This module supports 1366 x 768 WXGA mode and can display 16.7M colors. The converter module for Backlight is not built in.

1.2 FEATURES

- Contrast ratio 500:1
- Response time 8ms.
- WXGA (1366 x 768 pixels) resolution.
- DE (Data Enable) only mode.
- LVDS (Low Voltage Differential Signaling) interface.
- RoHS compliance.
- White LED Backlight Unit
- Low power consumption

1.3 APPLICATION

- TFT LCD Monitor

1.4 GENERAL SPECIFICATI0NS

Item	Specification	Unit	Note
Active Area	344.232(H) × 193.536(V) (15.6" diagonal)	mm	(1)
Bezel Opening Area	347.5(H)x196.8(V)	mm	
Driver Element	a-si TFT active matrix	-	-
Pixel Number	1366 x R.G.B. x 768	pixel	-
Pixel Pitch	0.252 (H) x 0.252 (V)	mm	-
Pixel Arrangement	RGB vertical stripe	-	-
Display Colors	16.7M	color	-
Color saturation	62 %NTSC (typ.)	-	-
Surface Treatment	AG type, 3H hard coating, Haze 25	-	-
Module Power Consumption	7.94	Watt	(2)

1.5 MECHANICAL SPECIFICATIONS

Item		Min.	Typ.	Max.	Unit	Note
Module Size	Horizontal(H)	363.3	363.8	364.3	mm	(1)
	Vertical(V)	215.4	215.9	216.4	mm	
	Depth(D)	10.4	10.9	11.6	mm	
Weight		-		1081	g	-

Note (1) Please refer to the attached drawings for more information of front and back outline dimensions.

Note (2) Please refer to the section 3.1 & 3.2 & 3.3 for more information of power consumption.

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2. ABSOLUTE MAXIMUM RATINGS

2.1 ABSOLUTE RATINGS OF ENVIRONMENT

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Storage Temperature	T_{ST}	-20	+60	ºC	(1)
Operating Ambient Temperature	T_{OP}	0	+50	ºC	(1), (2)
Shock (Non-Operating)	S_{NOP}	-	50	G	(3), (5)
Vibration (Non-Operating)	V_{NOP}	-	1.5	G	(4), (5)

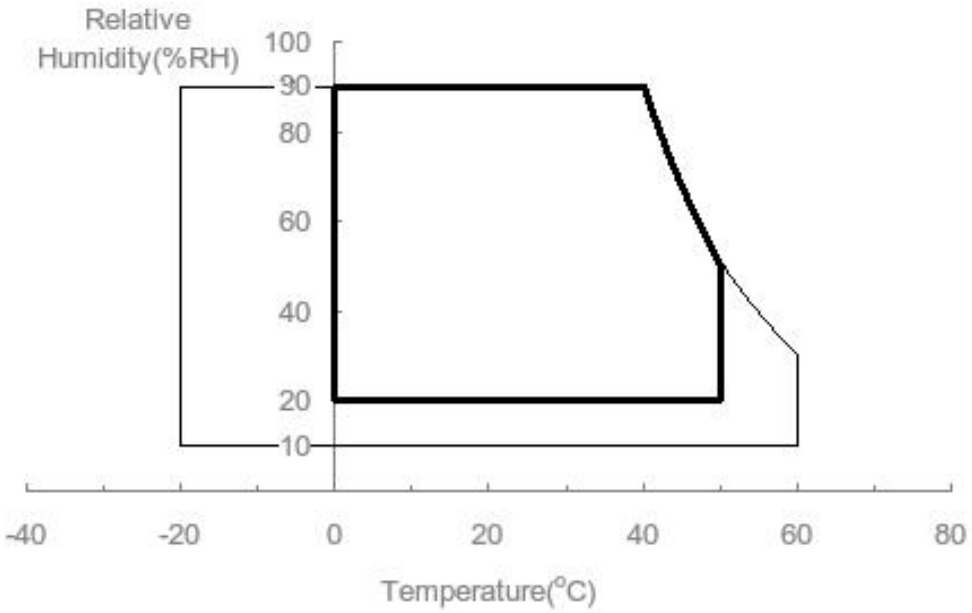
Note (1) Temperature and relative humidity range is shown in the figure below.

(a) 90 %RH Max. (Ta ≦ 40 ºC).

(b) Wet-bulb temperature should be 39 ºC Max. (Ta > 40 ºC).

(c) No condensation.

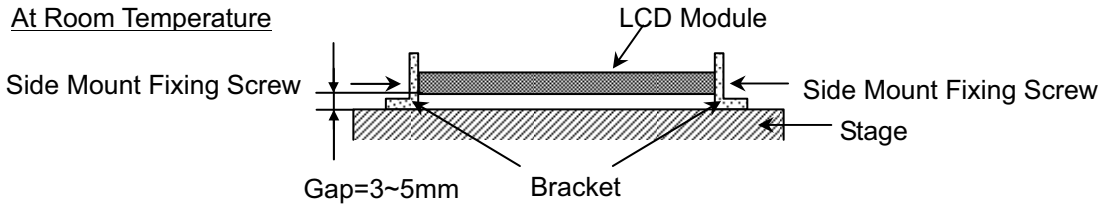
Note (2) The temperature of panel display surface area should be 0 ºC Min. and 60 ºC Max.



Note (3) 50G,11ms, half sine wave, 1 time for ± X, ± Y, ± Z.

Note (4) 10 ~ 300 Hz, 10min/cycle, 3 cycles each X, Y, Z.

Note (5) At testing Vibration and Shock, the fixture in holding the module has to be hard and rigid enough so that the module would not be twisted or bent by the fixture.



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2.2 ELECTRICAL ABSOLUTE RATINGS

2.2.1 TFT LCD MODULE

Item	Symbol	Value		Unit	Note
		Min.	Max.		
Power Supply Voltage	Vcc	-0.3	+6.0	V	(1)
Logic Input Voltage	Vlogic	-0.3	+2.8	V	

Note (1) Permanent damage might occur if the module is operated at conditions exceeding the maximum values.

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3. ELECTRICAL CHARACTERISTICS

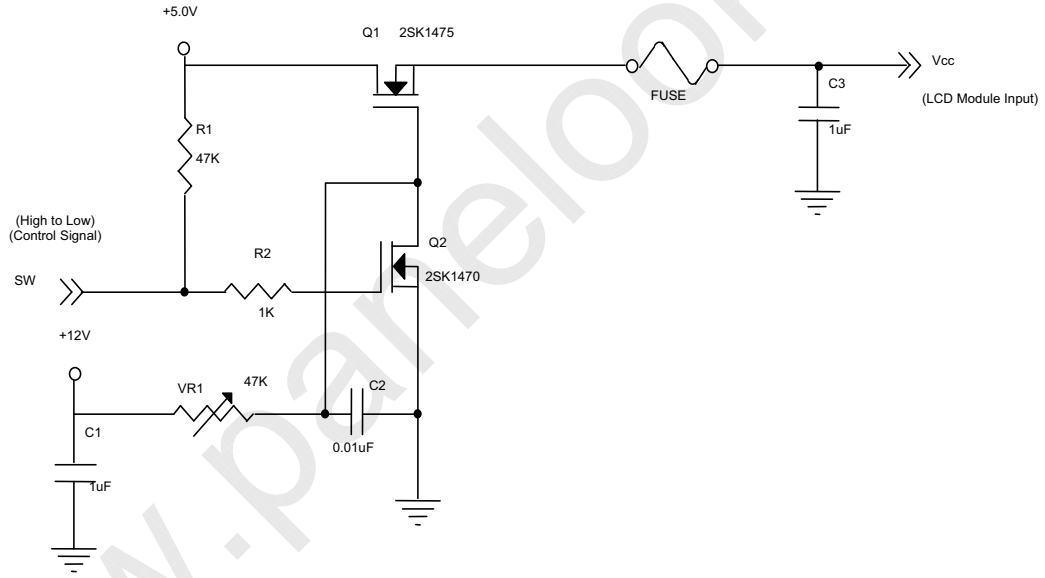
3.1 TFT LCD MODULE

Ta = 25 ± 2 ºC

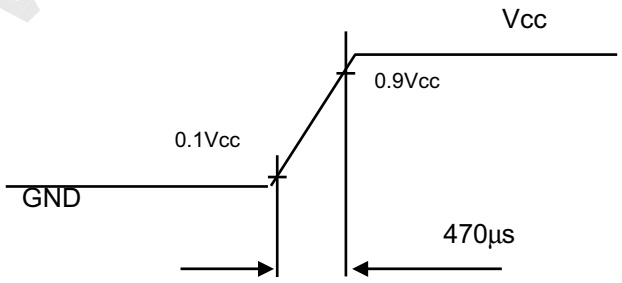
Parameter		Symbol	Value			Unit	Note
			Min.	Typ.	Max.		
Power Supply Voltage		Vcc	4.5	5.0	5.5	V	-
Ripple Voltage		V_{RP}	-	-	100	mV	-
Rush Current		I_{RUSH}	-	0.84	2	A	(2)
Power Supply Current	White	-	-	0.31	0.37	A	(3)a
	Black	-	-	0.38	0.46	A	(3)b
	Vertical Stripe	-	-	0.41	0.5	A	(3)c
Power Consumption		P_{LCD}	-	2.05	2.5	watt	(4)
LVDS differential input voltage		Vid	100	-	600	mV	
LVDS common input voltage		Vic	-	0.8	-	V	

Note (1) The module should be always operated within above ranges.

Note (2) Measurement Conditions:



Vcc rising time is 470µs



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Note (3) The specified power supply current is under the conditions at Vcc = 5.0 V, Ta = 25 ± 2 ºC, f_v = 60 Hz, whereas a power dissipation check pattern below is displayed.

Note(4) The power consumption is specified at the pattern with the maximum current.

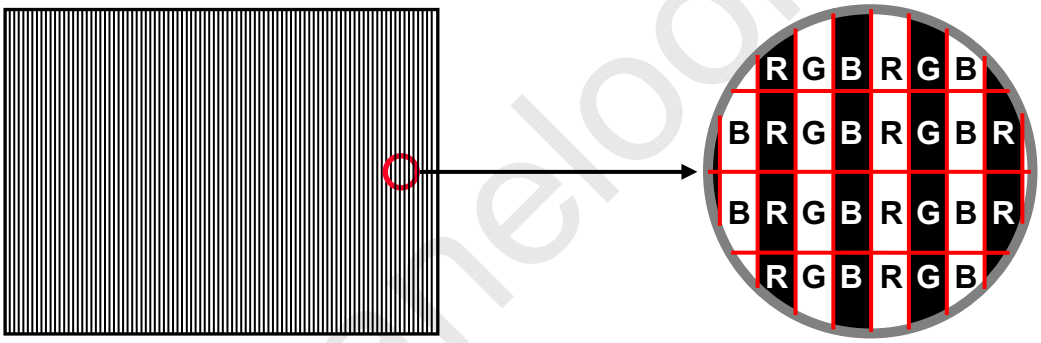
a. White Pattern

Active Area

b. Black Pattern

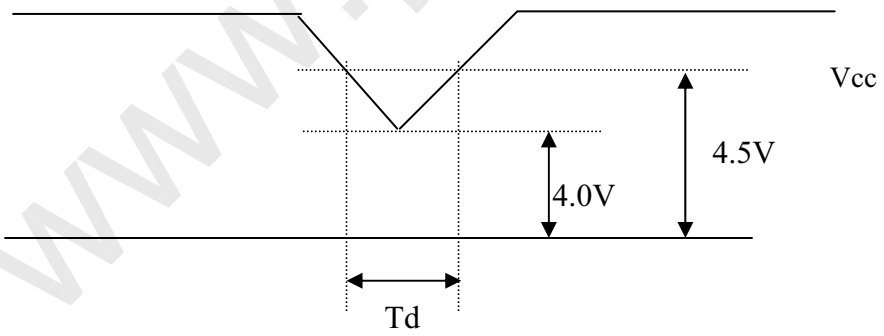
Active Area

c. Vertical Stripe Pattern



Active Area

3.2 Vcc Power Dip Condition:



Dip condition: $4.0V \le Vcc \le 4.5V, Td \le 20ms$

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3.3 BACKLIGHT UNIT

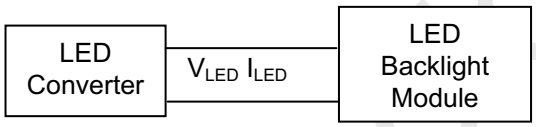
Ta = 25 ± 2 ºC

Parameter	Symbol	Value			Unit	Note
		Min.	Typ.	Max.		
LED light bar Input Voltage	V_O	28	33	36	V_{DC}	(1), (Duty 100%) I_{pin}=20mA
LED light bar Lamp Current	I_{pin}	--	20	30	mA_{DC}	(1), (Duty 100%)
LED Life Time	L_{BL}	25000	---	---	Hrs	(2)
Power Consumption	P_O	---	5.94	---	W	(3), I_L = 180mA

Note (1) LED light bar voltage and current are measured by utilizing a high frequency current meter a s shown below:

Note (2) The lifetime of LED is defined as the time when it continues to operate under the conditions at Ta = 25 ±2 oC and I_{LED} = 40 mA(Per package) until the brightness becomes ≦ 50% of its original value.

Note (3) $P_O = I_{pin} \times V_O \times$ (pin #)



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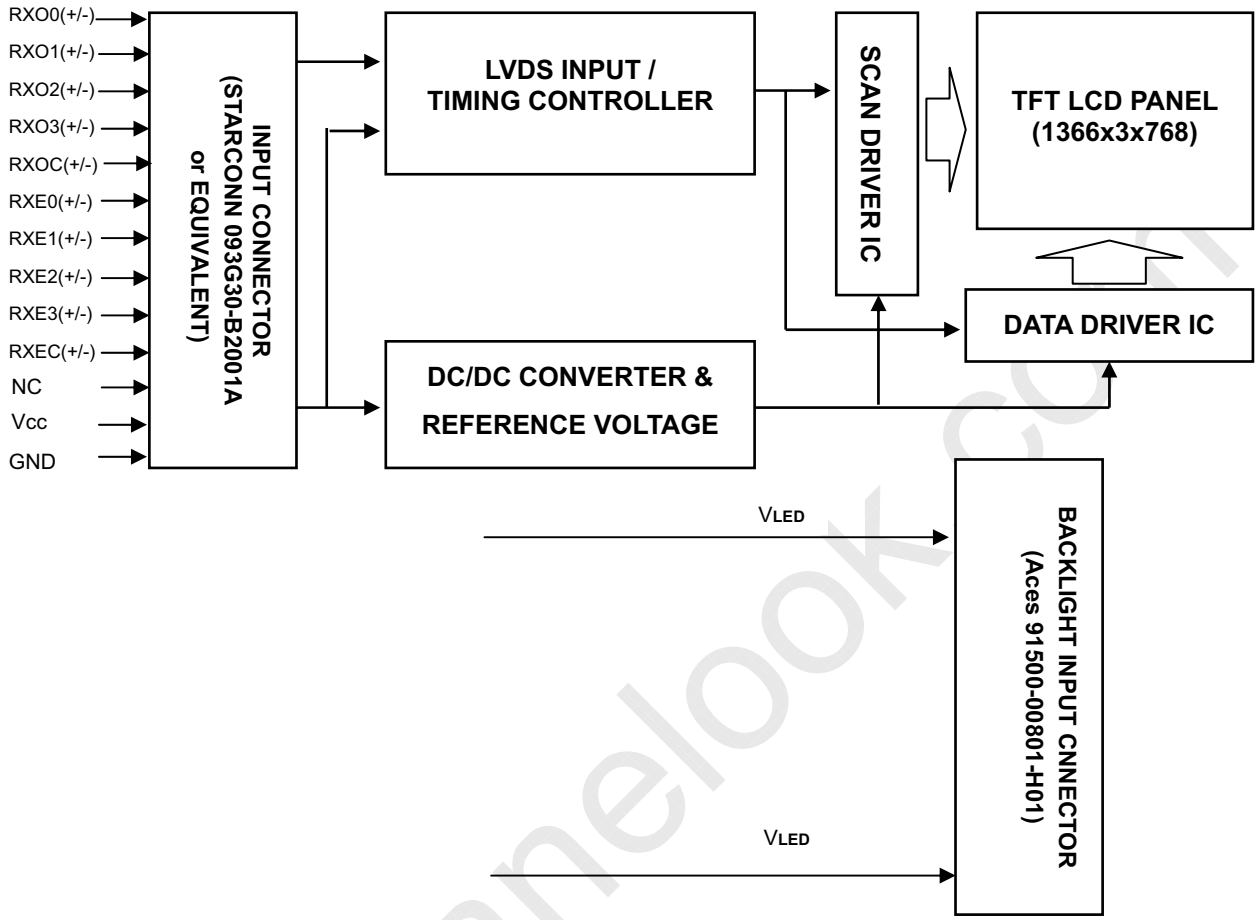
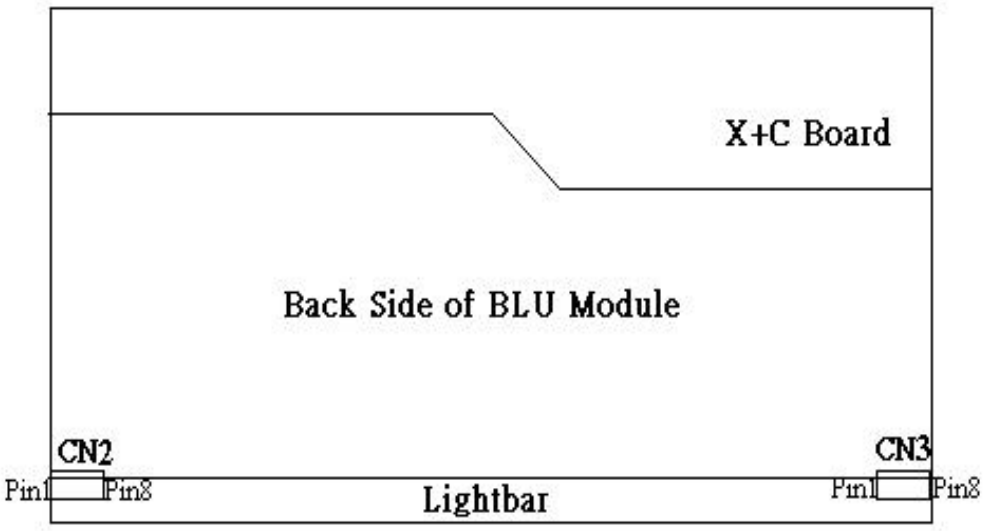
4. BLOCK DIAGRAM

4.1 TFT LCD MODULE



4.2 BACKLIGHT UNIT



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5. INPUT TERMINAL PIN ASSIGNMENT

5.1 TFT LCD MODULE

Pin	Name	Description
1	NC	Not connection, this pin should be open.
2	NC	Not connection, this pin should be open.
3	NC	Not connection, this pin should be open.
4	GND	Ground
5	RX0-	Negative LVDS differential data input. Channel 0
6	RX0+	Positive LVDS differential data input. Channel 0
7	GND	Ground
8	RX1-	Negative LVDS differential data input. Channel 1
9	RX1+	Positive LVDS differential data input. Channel 1
10	GND	Ground
11	RX2-	Negative LVDS differential data input. Channel 2
12	RX2+	Positive LVDS differential data input. Channel 2
13	GND	Ground
14	RXCLK-	Negative LVDS differential clock input.
15	RXCLK+	Positive LVDS differential clock input.
16	GND	Ground
17	RX3-	Negative LVDS differential data input. Channel 3
18	RX3+	Positive LVDS differential data input. Channel 3
19	GND	Ground
20	NC	Not connection, this pin should be open.
21	NC	Not connection, this pin should be open.
22	AGMODE	AGMODE should be tied to ground or open.
23	GND	Ground
24	GND	Ground
25	GND	Ground
26	Vcc	+5.0V power supply
27	Vcc	+5.0V power supply
28	Vcc	+5.0V power supply
29	Vcc	+5.0V power supply
30	Vcc	+5.0V power supply

Note (1) Connector Part No.: 093G30-B2001A (STARCONN)

5.2 LVDS DATA MAPPING TABLE

LVDS Channel 0	LVDS output	D7	D6	D4	D3	D2	D1	D0
	Data order	G0	R5	R4	R3	R2	R1	R0
LVDS Channel 1	LVDS output	D18	D15	D14	D13	D12	D9	D8
	Data order	B1	B0	G5	G4	G3	G2	G1
LVDS Channel 2	LVDS output	D26	D25	D24	D22	D21	D20	D19
	Data order	DE	NA	NA	B5	B4	B3	B2
LVDS Channel 3	LVDS output	D23	D17	D16	D11	D10	D5	D27
	Data order	NA	B7	B6	G7	G6	R7	R6

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5.3 BACKLIGHT SPECIFICATION

5.3.1 Connector type

Iutput connector: 91500-00801 (Aces)

5.3.2 Input connector pin assignment: CN2

Input Connector pin assignment: CN3

(1) Input connector pin assignment: CN2

Input connector CN2		Comments
(vendor) (Aces)	(type) 91500-00801	
Pin	**Function**	
1	VLED (33V)	Input voltage Power Supply + (33V.typ)
2	VLED (33V)	Input voltage Power Supply + (33V.typ)
3	NC	No connect
4	LED1	LED1 negative polarity
5	LED2	LED2 negative polarity
6	LED3	LED3 negative polarity
7	LED4	LED4 negative polarity
8	LED5	LED5 negative polarity

(2) Input connector pin assignment: CN3

Input connector CN3		Comments
(vendor) (Aces)	(type) 91500-00801	
Pin	**Function**	
1	LED9	LED9 negative polarity
2	LED8	LED8 negative polarity
3	LED7	LED7 negative polarity
4	LED6	LED6 negative polarity
5	NC	No connect
6	NC	No connect
7	VLED (33V)	Input voltage Power Supply + (33V.typ)
8	VLED (33V)	Input voltage Power Supply + (33V.typ)

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5.4 COLOR DATA INPUT ASSIGNMENT

The brightness of each primary color (red, green and blue) is based on the 8-bit gray scale data input for the color. The higher the binary input, the brighter the color. The table below provides the assignment of color versus data input.

Color		Data Signal																							
		Red								Green								Blue							
		R7	R6	R5	R4	R3	R2	R1	R0	R7	R6	G5	G4	G3	G2	G1	G0	R7	R6	B5	B4	B3	B2	B1	B0
Basic Colors	Black	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	Blue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Cyan	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Magenta	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1
	Yellow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
	White	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Gray Scale Of Red	Red(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(1)	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(2)	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Red(253)	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(254)	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Red(255)	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gray Scale Of Green	Green(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Green(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	Green(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
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	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:	:
	Green(253)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0
	Green(254)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0
	Green(255)	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0
Gray Scale Of Blue	Blue(0) / Dark	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Blue(1)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	Blue(2)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
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	Blue(253)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	1
	Blue(254)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0
	Blue(255)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1

Note (1) 0: Low Level Voltage, 1: High Level Voltage

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6. INTERFACE TIMING

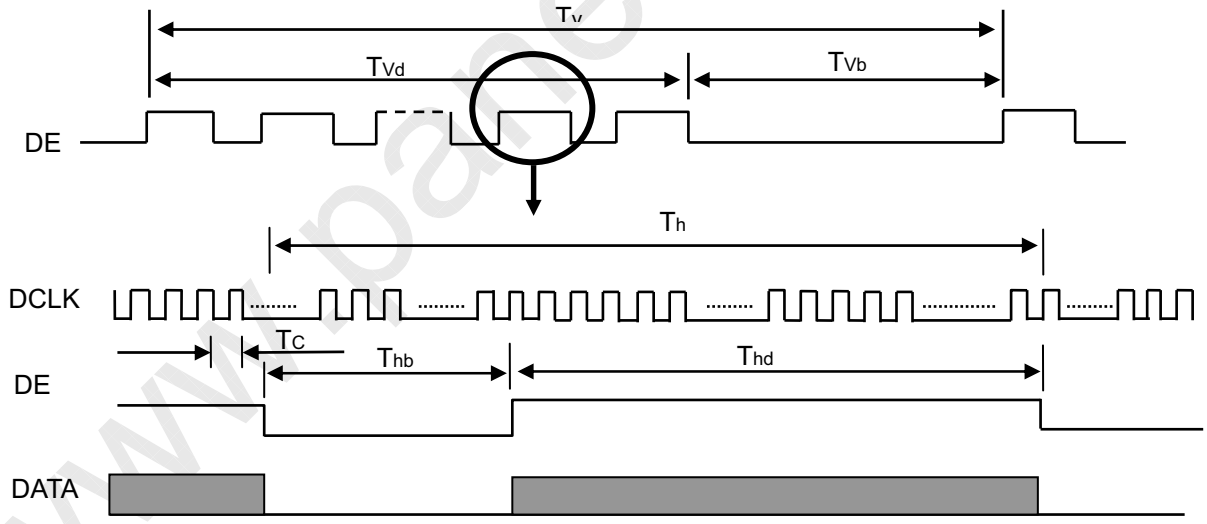
6.1 INPUT SIGNAL TIMING SPECIFICATIONS

The input signal timing specifications are shown as the following table and timing diagram.

Signal	Item	Symbol	Min.	Typ.	Max.	Unit	Note
LVDS Clock	Frequency	Fc	60	76	96	MHz	-
	Period	Tc		13		ns	
	High Time	Tch	-	4/7	-	Tc	-
	Low Time	Tcl	-	3/7	-	Tc	-
LVDS Data	Setup Time	Tlvs	600	-	-	ps	-
	Hold Time	Tlvh	600	-	-	ps	-
Vertical Active Display Term	Frame Rate	Fr	50	60	76	Hz	Tv=Tvd+Tvb
	Total	Tv	800	806	815	Th	-
	Display	Tvd	768	768	768	Th	-
	Blank	Tvb	Tv-Tvd	38	Tv-Tvd	Th	-
Horizontal Active Display Term	Total	Th	1500	1560	1570	Tc	Th=Thd+Thb
	Display	Thd	1366	1366	1366	Tc	-
	Blank	Thb	Th-Thd	194	Th-Thd	Tc	-

Note: Because this module is operated by DE only mode, Hsync and Vsync input signals should be set to low logic level or ground. Otherwise, this module would operate abnormally.

INPUT SIGNAL TIMING DIAGRAM



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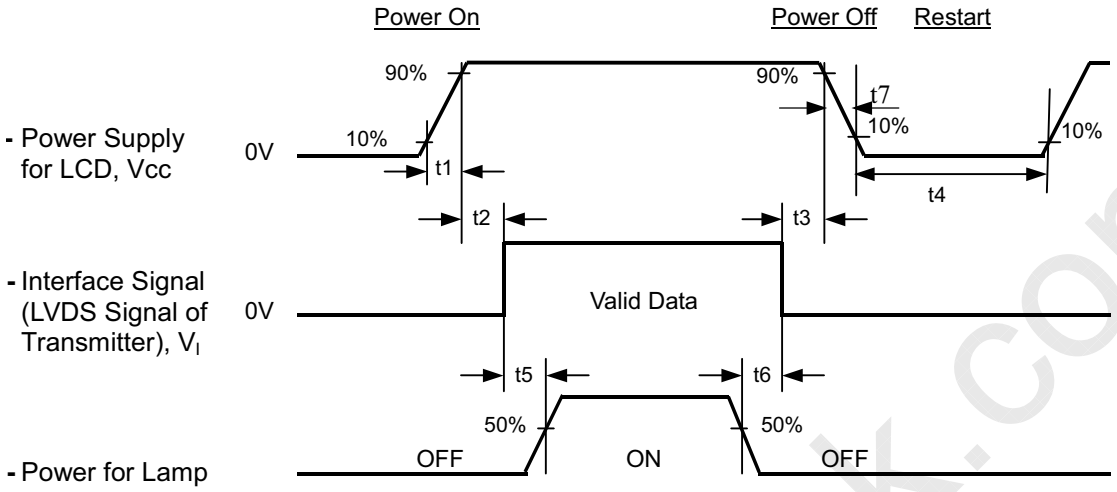
6.2 POWER ON/OFF SEQUENCE

To prevent a latch-up or DC operation of LCD module, the power on/off sequence should be as the diagram below.



Timing Specifications:

0.5< t1 ≦ 10 msec
0 < t2 ≦ 50 msec
0 < t3 ≦ 50 msec
t4 ≧ 500 msec
t5 ≧ 450 msec
t6 ≧ 90 msec
5 ≦ t7 ≦ 100 msec

Note.

(1) The supply voltage of the external system for the module input should be the same as the definition of Vcc.
(2) Apply the light bar voltage within the LCD operation range. When the backlight turns on before the LCD operation of the LCD turns off before the backlight turns off, the display may momentarily become abnormal screen.
(3) In case of Vcc = off level, please keep the level of input signals on the low or keep a high impedance.
(4) t4 should be measured after the module has been fully discharged between power of and on period.
(5) Interface signal shall not be kept at high impedance when the power is on.
(6) CMO won't take any responsibility for the products which are damaged by the customers not following the Power Sequence.
(7) There might be slight electronic noise when LCD is turned off (even backlight unit is also off). To avoid this symptom, we suggest "Vcc falling timing" to follow "t7 spec".

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7. OPTICAL CHARACTERISTICS

7.1 TEST CONDITIONS

Item	Symbol	Value	Unit
Ambient Temperature	Ta	25±2	°C
Ambient Humidity	Ha	50±10	%RH
Supply Voltage	V_{CC}	5.0	V
Input Signal	According to typical value in "3. ELECTRICAL CHARACTERISTICS"		
LED Light Bar Input Current (per pin)	I_{pin}	20±0.6	mA
LED Light Bar Test Converter	IV37085/T-HF/H05-6333,Rev.01,32 V,0 V,180 mA ,Sumida Suzhou _LED Converter, MP3900		

7.2 OPTICAL SPECIFICATIONS

The relative measurement methods of optical characteristics are shown in 7.2. The following items should be measured under the test conditions described in 7.1 and stable environment shown in Note (5).

Item		Symbol	Condition	Min.	Typ.	Max.	Unit	Note
Color Chromaticity (CIE 1931)	Red	Rx	θ_x=0° , θ_Y =0° CS-1000T	Typ - 0.05	0.624	Typ + 0.05	-	(1), (5)
		Ry			0.346			
	Green	Gx			0.335			
		Gy			0.604			
	Blue	Bx			0.160			
		By			0.071			
	White	Wx		0.263	0.313	0.363		
		Wy		0.279	0.329	0.379		
Center Luminance of White (Center of Screen)		L_C		200	250	-	cd/m^2	(4), (5)
Contrast Ratio		CR		350	500	-	-	(2), (5)
Response Time		T_R	θ_x=0° , θ_Y =0°	-	2	4	ms	(3), (7)
		T_F		-	6	12		
		$T_{GtG\ AVE}$		-	-			
White Variation		δW	θ_x=0° , θ_Y =0°	---	---	1.33	-	(5), (6)
Viewing Angle	Horizontal	θ_x+	CR ≧ 5	45	50	-	Deg.	(1), (5)
		θ_x-		45	50	-		
	Vertical	θ_Y+		25	30	-		
		θ_Y-		45	50	-		
Viewing Angle	Horizontal	θ_x+	CR ≧ 10	40	45	-	Deg.	(1), (5)
		θ_x-		40	45	-		
	Vertical	θ_Y+		15	20	-		
		θ_Y-		40	45	-		

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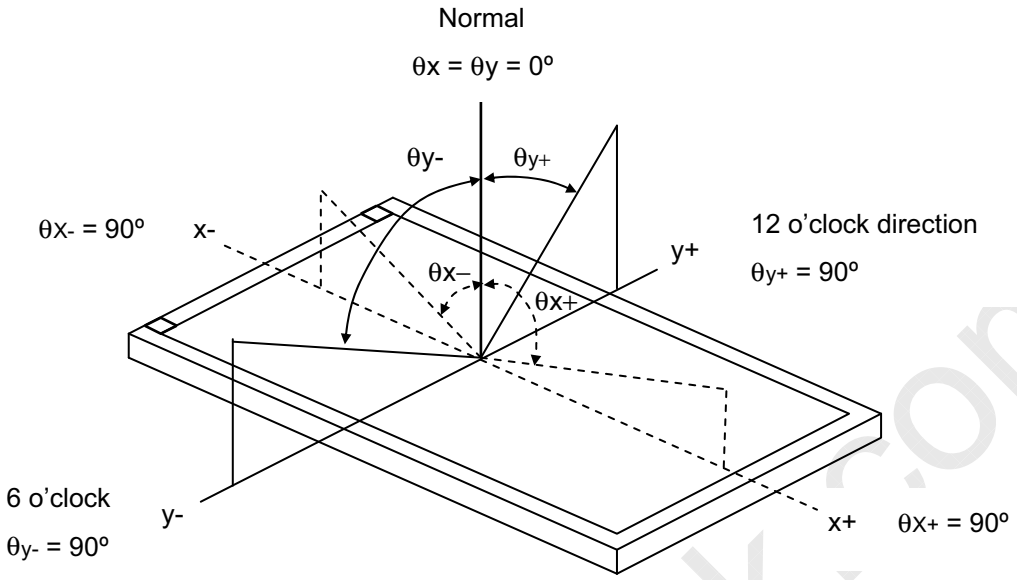
Note (1) Definition of Viewing Angle (θx, θy):



Note (2) Definition of Contrast Ratio (CR):

The contrast ratio can be calculated by the following expression.

Contrast Ratio (CR) = L255 / L0

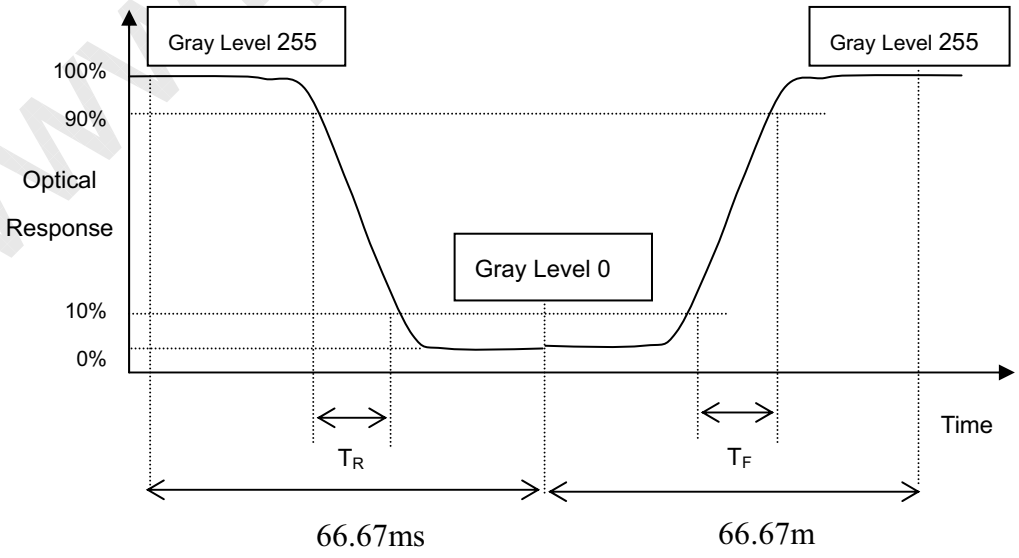
L255: Luminance of gray level 255

L 0: Luminance of gray level 0

CR = CR (1)

CR (X) is corresponding to the Contrast Ratio of the point X at Figure in Note (6).

Note (3) Definition of Response Time (T_R, T_F):



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Note (4) Definition of Luminance of White (L_C):

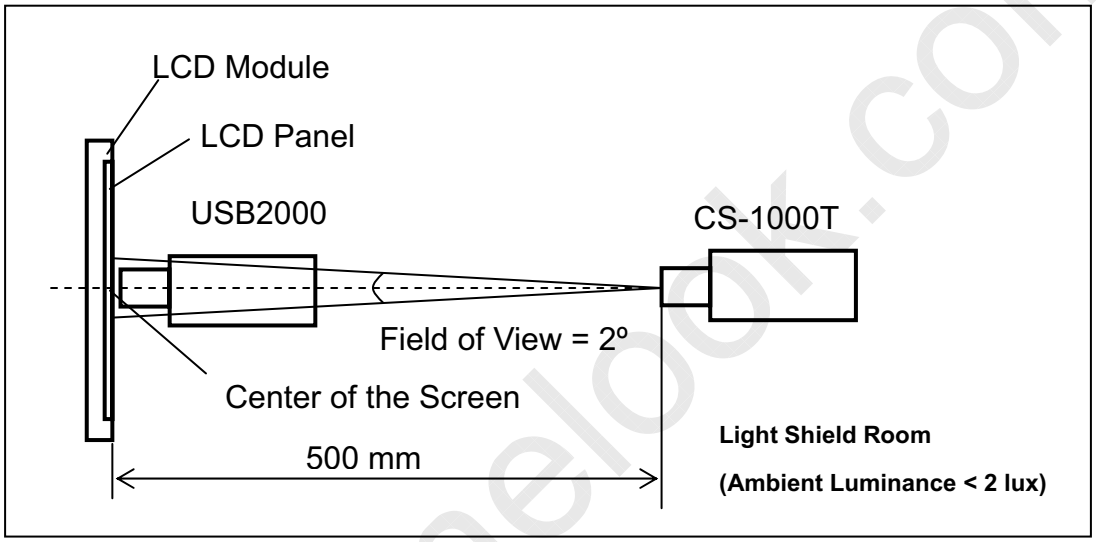
Measure the luminance of gray level 255 at center point

L_C = L (1)

L (x) is corresponding to the luminance of the point X at Figure in Note (6).

Note (5) Measurement Setup:

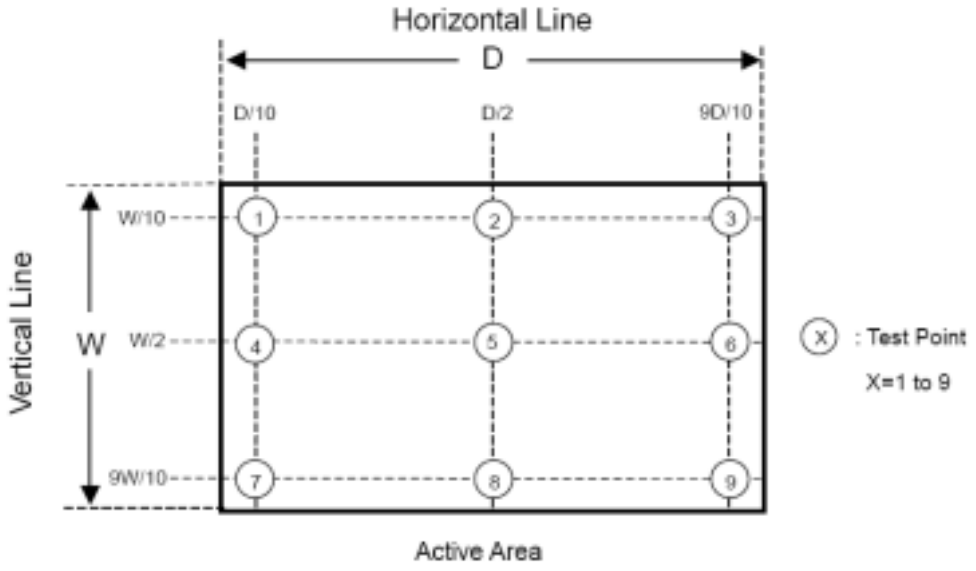
The LCD module should be stabilized at given temperature for 40 minutes to avoid abrupt temperature change during measuring. In order to stabilize the luminance, the measurement should be executed after lighting Backlight for 40 minutes in a windless room.



Note (6) Definition of White Variation (δW):

Measure the luminance of gray level 255 at 9 points

δW = Maximum [L (1), L (2) ……L (4), L (9)] / Minimum [L (1), L (2) …… L (4), L (9)]



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8. PACKAGING

8.1 PACKING SPECIFICATIONS

(1) 12 LCD modules / 1 Box

(2) Box dimensions: 490(L) X 325(W) X 320(H) mm

(3) Weight: approximately 15.7Kg (12 modules per box)

8.2 PACKING METHOD

(1) Carton Packing should have no failure in the following reliability test items.

Test Item	Test Conditions	Note
Vibration	ISTA STANDARD Random, Frequency Range: 1 – 200 Hz Top & Bottom: 30 minutes (+Z), 10 min (-Z), Right & Left: 10 minutes (X) Back & Forth 10 minutes (Y)	Non Operation
Dropping Test	1 Corner, 3 Edge, 6 Face, ISTA STANDARD	Non Operation

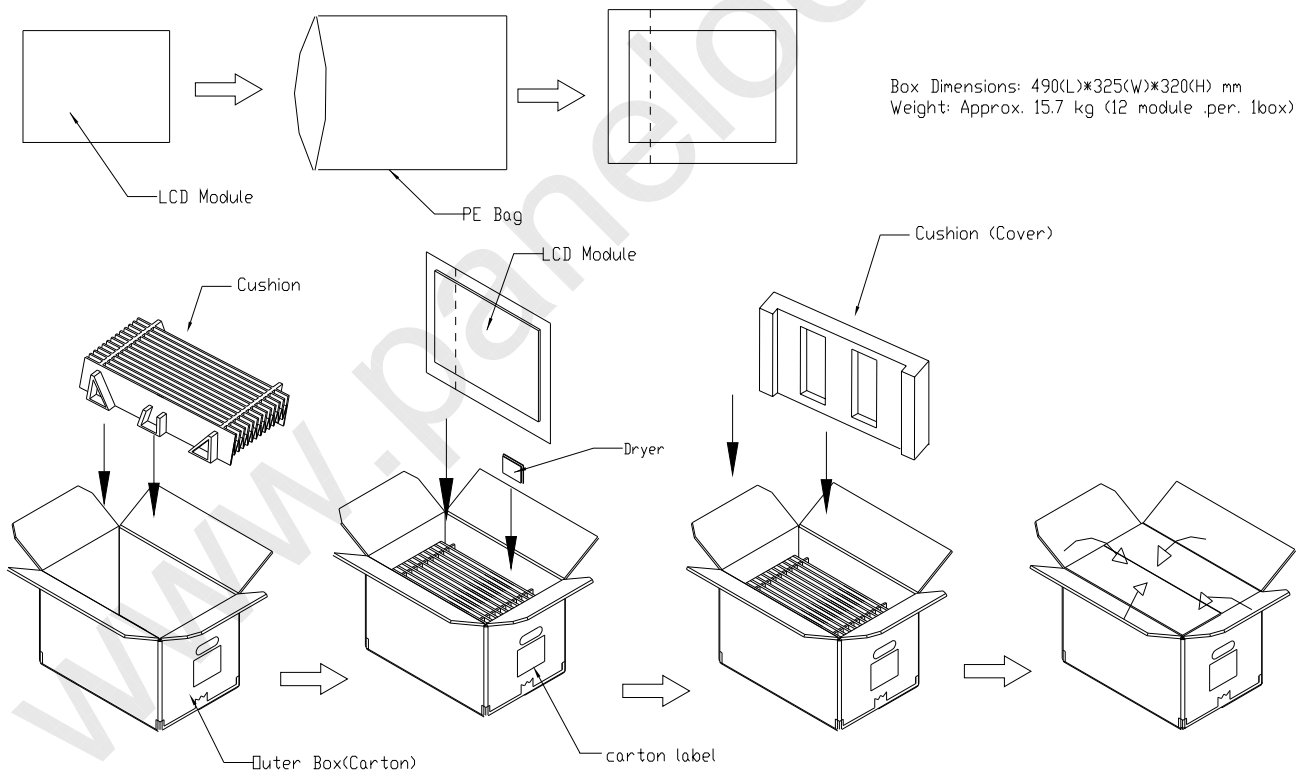

Figure. 8-1 Packing method

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For ocean shipping

Sea / Land Transportation (40ft Container)

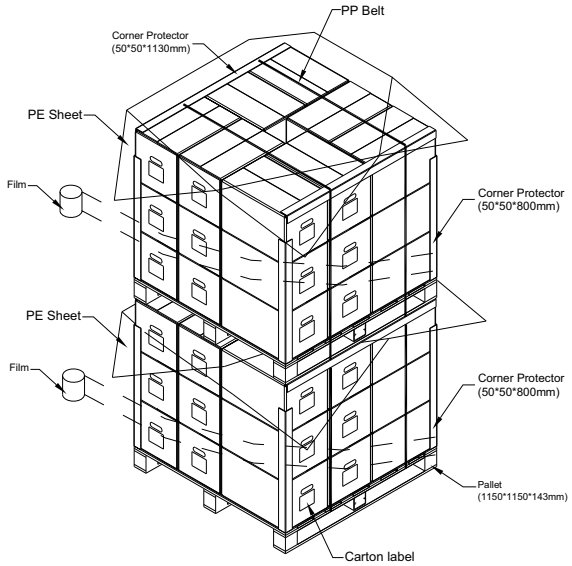

Figure. 8-2 Packing method

For air transport

Air transportation

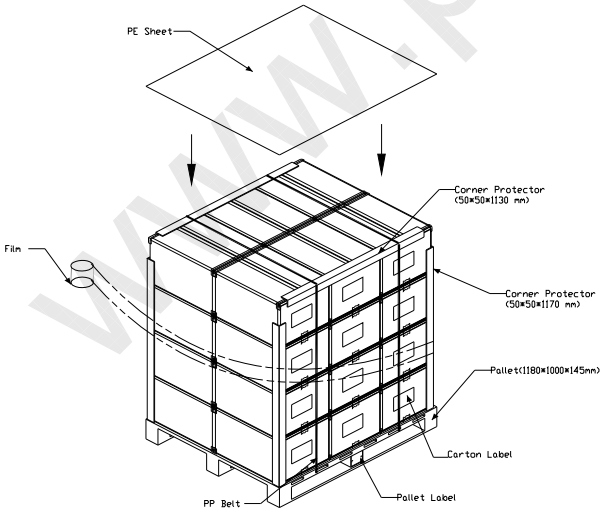

Figure. 8-3 Packing method

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9. DEFINITION OF LABELS

9.1 CMO MODULE LABEL

The barcode nameplate is pasted on each module as illustration, and its definitions are as following explanation.

(a) Model Name: M156B3-L01

(b) Revision: Rev. XX, for example: A0, A1… B1, B2… or C1, C2…etc.

(c) CMO barcode definition:

Serial ID: XX-XX-X-XX-YMD-L-NNNN

Code	Meaning	Description
XX	CMO internal use	-
XX	Revision	Cover all the change
X	CMO internal use	-
YMD	Year, month, day	Year: 2001=1, 2002=2, 2003=3, 2004=4… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31=1, 2, 3, ~, 9, A, B, C, ~, W, X, Y, exclude I, O, and U.
L	Product line #	Line 1=1, Line 2=2, Line 3=3, …
NNNN	Serial number	Manufacturing sequence of product

(d) Customer's barcode definition:

Serial ID: CM-15B31-X-X-X-XX-L-XX-L-YMD-NNNN

Code	Meaning	Description
CM	Supplier code	CMO=CM
15B31	Model number	M156B3-L01=15B31
X	Revision code	Non ZBD: 1,2,~,8,9 / ZBD: A~Z
X	Source driver IC code	Century=1, CLL=2, Demos=3, Epson=4, Fujitsu=5, Himax=6, Hitachi=7, Hynix=8, LDI=9, Matsushita=A, NEC=B, Novatec=C, OKI=D, Philips=E, Renasas=F, Samsung=G, Sanyo=H, Sharp=I, TI=J, Topro=K, Toshiba=L, Windbond=M
X	Gate driver IC code	
XX	Cell location	Tainan, Taiwan=TN
L	Cell line #	1,2,~,9,A,B,~,Y,Z
XX	Module location	Tainan, Taiwan=TN ; Ningbo China=NP
L	Module line #	1,2,~,9,A,B,~,Y,Z
YMD	Year, month, day	Year: 2001=1, 2002=2, 2003=3, 2004=4… Month: 1~12=1, 2, 3, ~, 9, A, B, C Day: 1~31= 1, 2, 3, ~, 9, A, B, C, ~, T, U, V
NNNN	Serial number	Manufacturing sequence of product

(e) FAB ID(UL Factory ID):

Region	Factory ID
TWCMO	GEMN
NBCMO	LEOO
NBCME	CANO
NHCMO	CAPG

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10. PRECAUTIONS

10.1 ASSEMBLY AND HANDLING PRECAUTIONS

(1) Do not apply rough force such as bending or twisting to the module during assembly.

(2) To assemble or install module into user's system can be only in clean working areas. The dust and oil may cause electrical short or worsen the polarizer.

(3) It's not permitted to have pressure or impulse on the module because the LCD panel and Backlight will be damaged.

(4) Always follow the correct power sequence when LCD module is connecting and operating. This can prevent damage to the CMOS LSI chips during latch-up.

(5) Do not pull the I/F connector in or out while the module is operating.

(6) Do not disassemble the module.

(7) Use a soft dry cloth without chemicals for cleaning, because the surface of polarizer is very soft and easily scratched.

(8) It is dangerous that moisture come into or contacted the LCD module, because moisture may damage LCD module when it is operating.

(9) High temperature or humidity may reduce the performance of module. Please store LCD module within the specified storage conditions.

(10) When ambient temperature is lower than 10ºC may reduce the display quality.

10.2 SAFETY PRECAUTIONS

(1) The startup voltage of Backlight is approximately 1000 Volts. It may cause electrical shock while assembling with inverter. Do not disassemble the module or insert anything into the Backlight unit.

(2) If the liquid crystal material leaks from the panel, it should be kept away from the eyes or mouth. In case of contact with hands, skin or clothes, it has to be washed away thoroughly with soap.

(3) After the module's end of life, it is not harmful in case of normal operation and storage.

10.3 SAFETY STANDARDS

The LCD module should be certified with safety regulations as follows:

(1) UL60950-1 or updated standard.

(2) IEC60950-1 or updated standard.

10.4 OTHER

When fixed patterns are displayed for a long time, remnant image is likely to occur.

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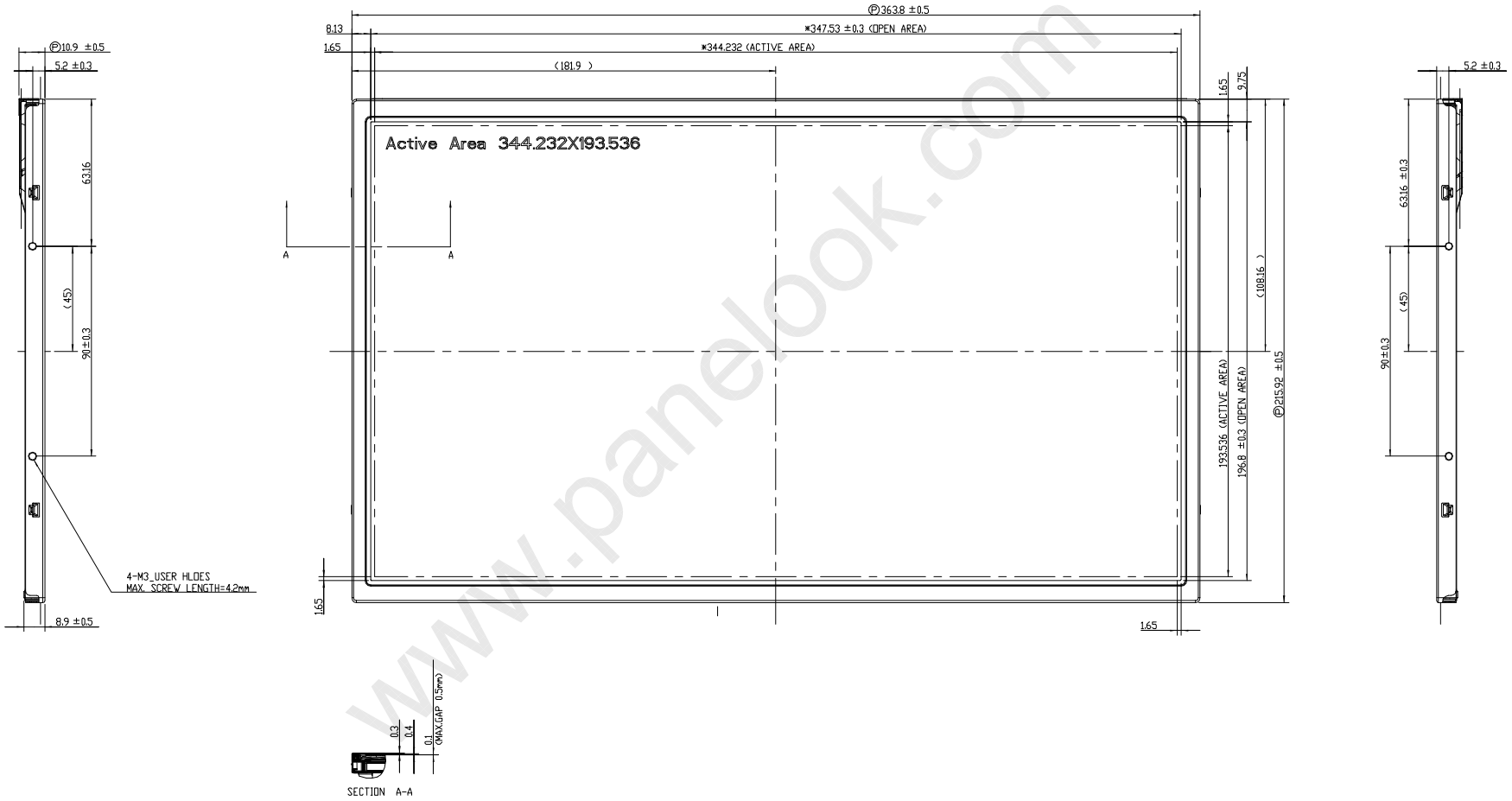

NOTES:
1.OUTLINE TOLERANCE: ±0.5mm.
2."*" MARKS THE DESIGN CRITICAL DIMENSION.
3." Ⓟ" MARKS THE PROCESS CRITICAL DIMENSION.
4.MAX.SCREW LENGTH:4 mm.
5.MAX.SCREW TORQUE:5 kg-cm.

Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

TITLE	ASSY_MODULE_M156B3-L01					2D REV.	
						3D REV.	L4+
Approved	YULE_LIN	Drawing No.	M156341011				
Checked	TAURUS_HSIEH	Part No.	TBD				
Drawer	JARED_CHIEN	Material	TBD			Sheet	1 / 2 A1
Designer	JARED_CHIEN	Date	21-Oct-2008	Scale	1:1	Unit:mm	

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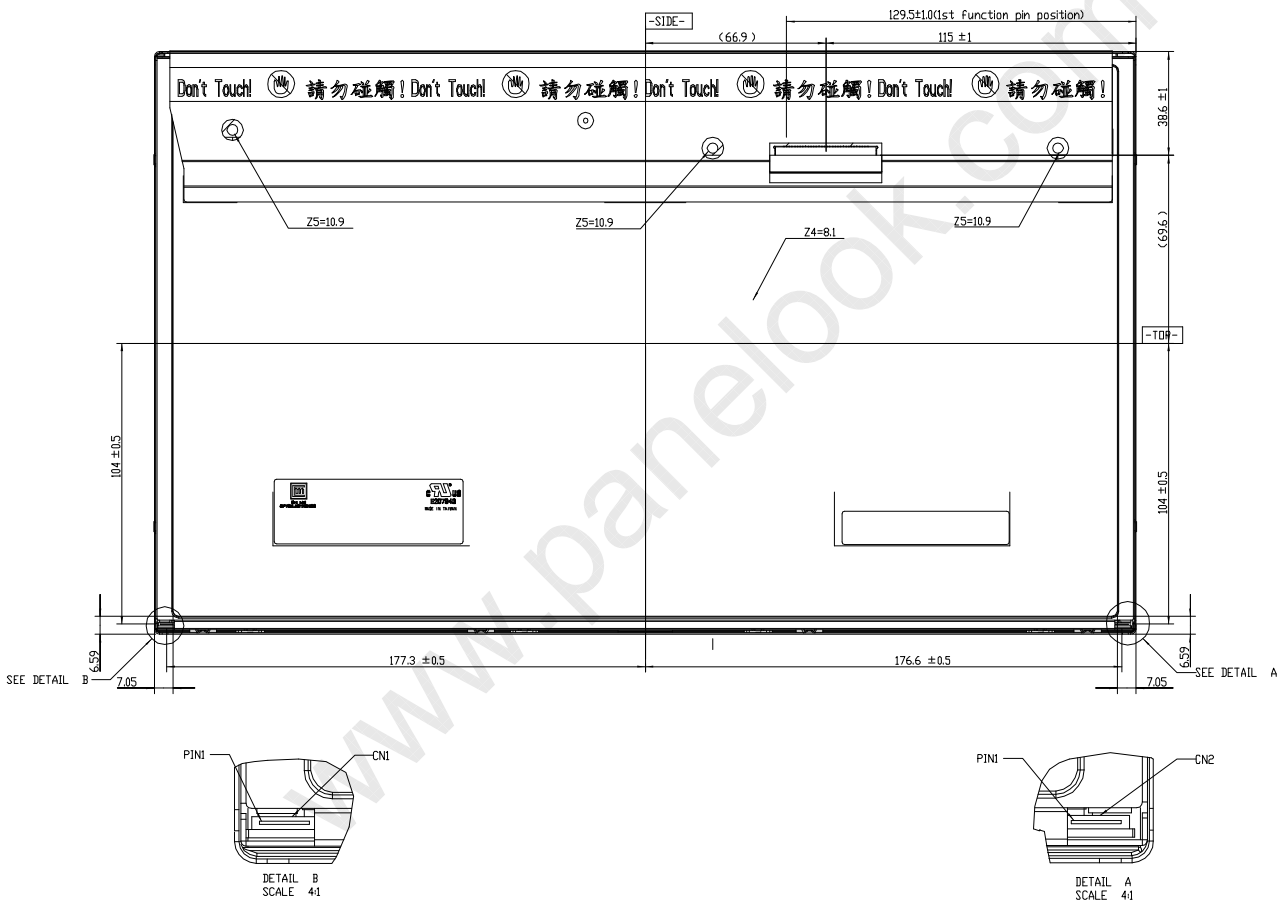

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Mark	Description	Date	Changed_By	Approved_By	ECN No.	Remark

General Tolerance Unless Specified				
0~6	±0.1	300~600	±0.3	
6~30	±0.15	600~	±0.6	
30~300	±0.2	ANGLE	±1.0°	

TITLE	ASSY_MODULE_M156B3-L01					2D REV.	01
						3D REV.	L5+
Approved	YULE_LIN	Drawing No.	M156341011				
Checked	TAURUS_HSIEH	Part No.	TBD				
Drawer	JARED_CHIEN	Material	TBD			Sheet	2 / 2 A1
Designer	JARED_CHIEN	Date	21-Oct-2008	Scale	1:1	Unit:mm	

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